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(54) Disposable syringes

(57) A hypodermic syringe has the total length of the piston and piston rod less than the total length of the barrel so that when an injection has been made and the contents of the barrel discharged, the head on the piston rod is received completely within the open end of the barrel making it difficult or impossible to withdraw the piston rod for a second operating cycle.

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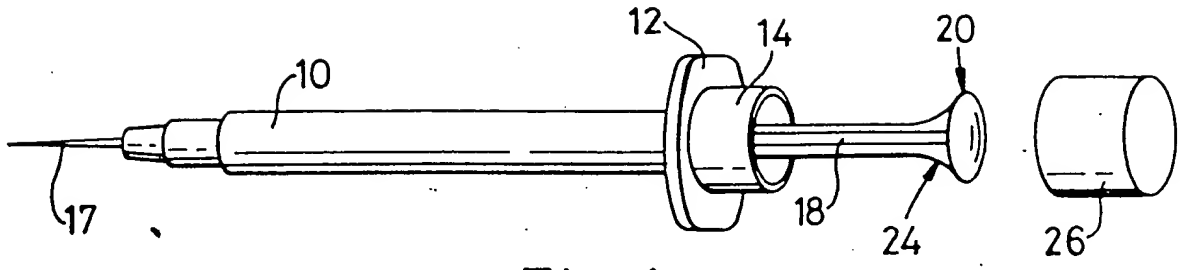

Fig. 1

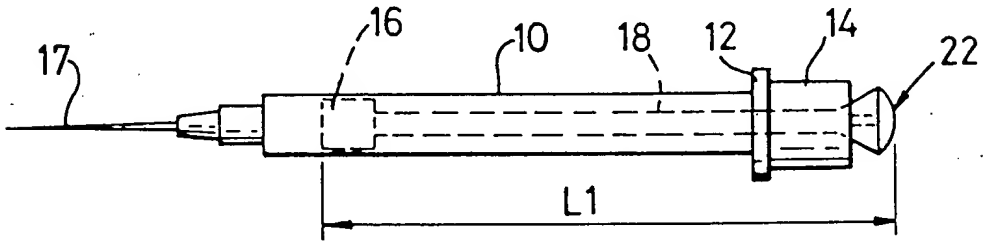

Fig. 2

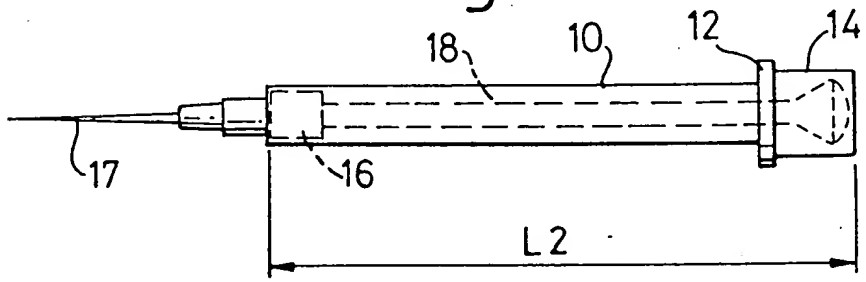

Fig. 3

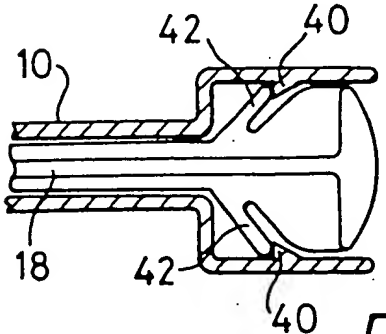

Fig. 4

DISPOSABLE SYRINGES

This invention relates to disposable hypodermic syringes.

It is well known that the re-use of hypodermic syringes carries with it the risk of infection and contamination. Many previous designs of disposable syringe have attempted to ensure that the syringe can only be used once, in various different ways. These proposals have led to complicated designs which are expensive to manufacture. In some cases the syringe had to be pre-filled which is not convenient for ordinary hospital use where the syringe may be required for many different purposes.

The object of the invention is to solve this problem by providing a once-only syringe which is particularly simple to manufacture.

In accordance with the invention a disposable syringe comprises a barrel provided with a needle or adapted for connection to a needle at one end, and having an opposite open end: a piston and piston rod located in the barrel and extending through the open end: and characterised in that the overall length of the piston and piston rod is less than the length of the barrel whereby, in normal operation, the piston rod is displaced within the barrel so as to be completed received in the barrel at the conclusion of an injection stroke.

Preferably the barrel has an enlarged diameter portion at the open end, and the piston rod is enlarged at the end opposite to the piston so as to afford an enlarged head for contact for example by the thumb of a user whose fingers engage behind lateral projections from the barrel.

Preferably the enlarged head includes tapering portions extending between the end face and the piston rod per se, so that if the piston rod is not centered in the barrel there is a reduced posibility of the outer end engaging the free end edge of the barrel.

Preferably also the extreme end surface, which is to be engaged for example by the thumb of a user, is slightly domed.

If desired, cooperating pawl and ratchet means may be provided between the piston rod and the end of the barrel so that once the end of the rod has travelled into the end of the barrel, it is engaged and held in that position.

The invention is more particularly described with reference to the accompanying drawing in which:-

Figure 1 is a perspective view showing the syringe of the present invention;

Figure 2 is an elevation of the same showing the parts in a position ready for use;

Figure 3 is a further elevation showing the syringe after use; and

Figure 4 is a fragmentary sectional elevation on an enlarged scale showing a modification.

Turning now to the drawings, the syringe comprises a barrel 10 which may be of circular cross section and uniform diameter over a substantial part of its length, and integral with transversely extending lugs 12. Between the lugs 12 and the free end, the barrel is of larger diameter at 14, having an open end at this part. The opposite end is provided with a needle 16, or may be adapted to be connected to a needle in that position.

The length and diameter of the barrel portion 10 dependent upon the volume to be dealt with in a single ordinary use of the needle.

The syringe further comprises a piston 16 carried on the end of a piston rod 18 which may be of cruciform section. The piston rod is integral with a head 20 which, as best seen in Figure 2, may be convexly domed at 22. The diameter of the head 20 is such as to be a sliding fit in the enlarged diameter portion 14 at the free end of the barrel. The portion of the piston rod immediately adjacent the head 20 is tapered at 24 so as to guide and centralise the piston rod as the head moves toward the free end of the enlarged portion 14.

The characteristic feature of the present

invention is that the overall length of the piston, piston rod and its head L1, is less than the total internal length L2 of the barrel portions 10 and 14.

The syringe of the invention may be delivered, ready for use, essentially in the Figure 2 condition; although the needle end may be kept in a sterile condition by a push-on cap (not shown) and the opposite end protected by a cap 26 which is a push-on fit on the enlarged diameter portion 15 and which prevents the end 22 being pushed in from the Figure 2 position to the Figure 3 position. There is thus a portion of the end 22 exposed, as in Figure 2, when the cap is removed so that the needle can be filled or part filled by displacing the piston 16 along the barrel towards the end 14, by holding the parts 12 for example between finger and thumb of one hand and drawing the piston rod outwardly by finger and thumb engaged with the end 22.

Subsequently, and after displacing any air from the barrel, the injection is made in the usual way by, for example, engaging two fingers behind the projections 12 and displacing the end 22 by means of the thumb of the same hand. At the conclusion of the injection, the head 22 enters the enlarged portion 14 as in Figure 3 and the head is then inaccessible.

It will be appreciated that the length of the barrel and the length of the rod need to be

accurately controlled so that in the Figure 3 position substantially the entire contents of the barrel will have been expressed.

If any attempt is made to reuse the syringe, it is at least very difficult to get the head 22 out of the enlarged portion 14. The head is to be a close a fit as possible in the portion 14 to prevent a pin being used as a lever to extract the head. The domed end also assists by displacing the maximum diameter portion of the head into the enlarged portion 14.

However, Figure 4 shows a modification in which prising the head out of the enlarged diameter portion is rendered even more difficult. This is achieved by providing a projection 40 inside the enlarged diameter portion 14, which may be a peripheral rib. The enlarged diameter portion of the piston rod is made with a series of finger-like projections or pawls 42 which are an interference fit with the rib. In other words, as the piston rod is displaced in use, the pawls encounter the rib and flex towards the longitudinal axis of the piston rod and then snap-engage behind the rib when the movement is completed. However the same flexing does not naturally occur in any attempted reverse movement.

The foregoing description refers to enlarged diameter portion 14, but it will be appreciated that the portion 14 could be of the same diameter as the

remainder of the barrel, providing the dimensions of the piston rod are such that the whole of it can be wholly received within the barrel at the completion of the injection stroke.

CLAIMS

1. A disposable syringe comprising a barrel provided with a needle or adapted for connection to a needle at one end, and having an opposite open end: a piston and piston rod located in the barrel and extending through the open end: and characterised in that the overall length of the piston and piston rod is less than the length of the barrel whereby, in normal operation, the piston rod is displaced within the barrel so as to be completed received in the barrel at the conclusion of an injection stroke.

2. A syringe as claimed in Claim 1 wherein the barrel has an enlarged diameter portion at the open end, and the piston rod is enlarged at the end opposite to the piston so as to afford an enlarged head for contact for example by the thumb of a user whose fingers engage behind lateral projections from the barrel.

3. A syringe as claimed in Claim 2 wherein the enlarged head includes tapering portions extending between the end face and the piston rod per se, so that if the piston rod is not centered in the barrel there is a reduced posibility of the outer end engaging the free end edge of the barrel.

4. A syringe as claimed in any preceding claim wherein the extreme end surface which is to be engaged for example by the thumb of a user, is slightly domed.

5. A syringe as claimed in any preceding claim wherein co-operating pawl and ratchet means are provided between the piston rod and the end of the barrel so that once the end of the rod has travelled into the end of the barrel, it is engaged and held in that position.

6. A syringe substantially as described with reference to Figures 1-3 or Figure 4 of the accompanying drawings.